

REMARKS

The final office action of June 16, 2000, has been fully considered by Applicants. In view of the following comments, entry of the above amendments and reconsideration of the application is respectfully requested.

1. Response to New Matter Objections

Applicants submit that the above amendments overcome the new matter objection/rejection. Furthermore, Applicants believe entry of the amendment is appropriate as the use of the term “conjugated diene units” in claim 1 was suggested by the Examiner. However, with respect to claim 22, the use of the term “non-vulcanized second polymer” is supported by the Examples wherein a non-vulcanized second polymer is employed.

2. Response to Rejection Under 35 USC § 112, First Paragraph

- a. Claims 1-4, 6, and 13-14 were rejected under 35 USC §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant submits that the claims were amended as explained above to overcome the Examiner's rejections.

- b. Claim 21 was rejected under 35 USC §112, first paragraph. The Examiner contends that the specification does not provide enablement for the language of claim 21. Specifically, the Examiner contends that the specification does not provide enablement for a reaction product comprising the first and second polymers. Applicants have adopted the Examiner's proposed language and withdrawal of the rejection is requested.

3. Response to Rejection Under 35 USC §112, Second Paragraph

Claims 1-4, 6-10, 13-14, and 21-22 were rejected under 35 USC §112, second paragraph, “as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Specifically, the Examiner states, “The language of Claims 1 and 22 are indefinite because the metes and bounds of “comprised substantially” cannot be determined.” The Examiner suggests the Applicant adhere to the transitional phrases set forth in MPEP §2111.03. In accord with the Examiner’s suggestion, Applicants have amended Claim 1 to read “consisting essentially of” rather than “comprised substantially of.” Applicants note, however, that the term “comprised substantially of” was not used in Claim 22 and therefore no amendment is necessary.

b. The Examiner deemed Claim 2 indefinite “...because said ‘carboxylic acid’ or ‘carboxylic anhydride’ is defined as a group not a compound.” Claim 2 has been slightly amended to read

...wherein compounds comprising said carboxylic acid or said anhydride pendant or terminal functional group comprises succinic acid or succinic anhydride.

c. Claims 7 and 9 were deemed “...indefinite because it is not known what a polymer comprising polybutadiene signifies.” According to the Examiner’s suggestion, those claims have been amended to read “butadiene units” rather than “polybutadiene units.”

d. Claim 10 was deemed “...indefinite because ‘said C₄-C₈ conjugated diene units’ lacks antecedent basis in Claim 1.” Applicants recognize this error and have amended claim 10 to read “...said second polymer is comprised of said polymer of conjugated diene units.

Applicants assert that the cited amendments remedy the Examiner’s concerns regarding Claims 1-4, 6-10, 13-14, and 21-22 regarding indefinite claims. Since the claims have been amended according to the Examiner’s suggestions, no new issues are raised and entry thereof is appropriate.

4. Response to Rejection Under 35 USC §102 (b)

Claims 1-4, 6-10, 13-14, and 21-22 were rejected under 35 USC §102(b) as being anticipated by Coran. Applicant respectfully traverses.

The Examiner states:

...there is nothing in the claims which exclude the presence of a vulcanized nitrile rubber. Applicant's comprising language clearly permits the presence of such.

Applicants first submit that claims directed to a second polymer "consisting essentially of" butadiene or styrene butadiene (for example) effectively exclude the necessary nitrile constituent of the Coran polymer. Furthermore, no motivation exists to modify Coran as the amine functionalized butadiene functions solely as a compatibilizer in the Coran polymer. In the present invention, the function of the amine functionalized butadiene is as a primary reactant. To further support this position, it should be noted that the Coran patent teaches the use of the amine terminated nitrile rubber as a compatibilizer in amounts less than 10 pbw (column 3, table 1). The present invention incorporates amine terminated butadiene as a major component in the reaction mix as seen in the Examples.

Furthermore, no new issues are raised by this amendment as traditional language is being submitted as suggested by the Examiner. Moreover, the concept of the claims excluding a "nitrile rubber" has already been considered.

5. Response to Rejection Under 35 USC §103(a)

Claims 1-4, 6-10, 13-14, and 21-22 were rejected under 35 USC §103(a) as being unpatentable over Berta in view of Stayer, Jr., and Admissions by Applicants. Applicants respectfully traverse.

As previously stated, the '573 patent to Berta teaches a four-part composition (and as much as a six-component system) consisting of (1) a thermoplastic olefin, (2) an anhydride-grafted thermoplastic polyolefin, (3) an oxidized polyethylene wax, and (4) a functionalized polymer that is reactive with the anhydride groups of the anhydride-grafted polymer.

The Examiner contends that a simple substitution of an amine functionalized butadiene (as in Stayer) for the Berta hydroxy-terminated butadiene is all that is necessary to achieve the present invention. This ignores the fact that hydroxy-terminated butadiene is only one of seven alternatives in the Berta teachings (column 1, line 65-column 2, line 24). In this regard, the skilled artisan is faced with considering all possible substituents for each of the seven

potential functionalized polymers of Berta. The resultant number of possibilities is countless. Moreover, no motivation to specifically select the hydroxy-terminated polybutadiene as the functionalized polymer to modify exists. Similarly, no motivation exists to link the amine-terminated olefin/alkylene oxide copolymer with the polybutadiene as a teaching on amine functionality. Add to this level of unguided selection to reach the present invention, the fact that the functionalized polymer is only 2 to 8 parts per hundred of the thermoplastic olefin, and the present reaction product invention is not prima facie obvious. Moreover, all substitutes for the functionalized prepolymer form part of the Berta disclosure—assuming the Examiner is correct that any motivation to alter this constituent exists—and have to be considered as part of the documents teaching to the skilled artisan. This daunting task would not lead to Applicants' claimed invention absent prohibited hindsight.

Furthermore, the present invention claims the reaction product of a first polymer, and a second polymer. As can be seen in Claim 1, the first polymer is a poly(olefin), including at least one pendent or terminal functional group and the second polymer includes conjugated diene units or a copolymer including conjugated diene units and vinyl aromatic units. The second polymer further includes at least one nitrogen containing terminated group. In the Berta patent, the functionalized polymer serves only as a minor constituent, not as a primary reaction component as in the present invention.

Finally, the Examiner contends:

... The argument that the oxidized wax and not the functionalized polymer interacts with the anhydride-grafted polymer is interesting but is not supported by scientific reasoning or evidence. It is also contrary to the clear teaching of Berta in this regard and the known reactivity of anhydride groups with amino and hydroxy groups.

Although Berta supposes the functionalized polymer reacts with the anhydride-grafted polymer, this supposition is not borne out in the examples. In fact, the opposite is true. As demonstrated by comparative examples 13, 14, 16, and 17 of the Berta patent, adducts of a functionalized polymer (amine-terminated polyethylene oxide, ATPEO) with an anhydride-grafted polyolefin (maleic anhydride-grafted ethylene/propylene

copolymer) are actually detrimental to the properties of the composition. Berta teaches, in comparative examples 12 and 15, the criticality of the presence of the oxidized polyethylene wax. To further support the Applicants contention, it should be noted that oxidized polyethylene wax contains oxygen functional groups which are capable of reacting, or interacting by polar forces, with anhydride-grafted polyolefins. Furthermore, the quantity of the oxidized wax is greater than the quantity of the functionalized polymer in the preferred embodiment.

With regards to Examiner's statement regarding "...the known reactivity of anhydride groups with amino and hydroxy groups," it should also be noted that while this reaction is well known for small molecules in organic chemistry, it can not be immediately concluded that appropriately functionalized polymers will react the same way, because polymer reactivity is also influenced by the degree to which the polymers are compatible. For example, nylon can react with anhydride-grafted polypropylene, but because of the incompatibility of the polymers, the reaction occurs only at the interface (Lawson, et al., Journal of Applied Polymer Science, vol. 39, p. 2331, (1990)). As is well known in the art, the degree of compatibility between phases has a marked effect on the physical properties of the polymer composition.

The results of Berta's examples support the Applicants' position that the anhydride-grafted polymer interacts with the oxidized wax. Conversely, Applicants provide clear evidence, by means of an extraction experiment, of an interaction between the functionalized polybutadiene and the maleic anhydride-grafted polypropylene, and of consequent improvements in the tensile properties of the composition. It should be noted that the ability of the oxidized wax to react with the maleic anhydride-grafted polypropylene would have a detrimental effect on the present composition. Therefore it would not be beneficial to include an oxidized polyethylene wax in the present invention.

Consequently, Applicants contend that in view of the teachings of the '573 patent to Berta, it would not have been obvious, other than through prohibited hindsight, to use the amine-terminated polybutadienes, as taught in US Patent 5,066,729 to Stayer, Jr. et al., to obtain a grafted polypropylene as described in the present application.

Applicants respectfully submit that the present invention, as set forth in claims 1-4, 6-10, 13-14, and 21-22, is patentable over the above-cited references. The above amendments and remarks cure the Examiner's opposition to the present application.

Applicants respectfully submit that the amended claims are novel and unobvious over the prior art and request allowance of the same.

If any fee is due in conjunction with the filing of this response, Applicants authorize deduction of that fee from Deposit Account No. 06-0308.

Respectfully Submitted,

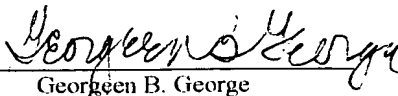
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CERTIFICATE OF MAILING

I hereby certify that this **AMENDMENT** is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231 on August 16, 2000.


George B. George

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